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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/501,145	07/13/2004	Lieven Anaf	016782-0310	5358

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EXAMINER	
LEUNG, RICHARD	

ART UNIT	PAPER NUMBER
4132	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/501,145	ANAF ET AL.	
	Examiner	Art Unit	
	RICHARD LEUNG	4132	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *7/13/04, Preliminary Amendment*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) ____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 July 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/13/2004*
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The Information Disclosure Statement Filed on 7/13/04 has been considered by the Examiner.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As to claim 1, it recites the limitation "said first metal fibers layer" in lines 3-5. There is insufficient antecedent basis for this limitation in the claim.

As to claim 1, it recites the limitation "the planar air permeability" in line 5. There is insufficient antecedent basis for this limitation in the claim.

As to claims 3, 5 and 7, they recite the limitation "said first metal fiber layers." There is insufficient antecedent basis for this limitation in the claim.

As to claims 4 and 8, they recite the limitation "said second metal fiber layers." There is insufficient antecedent basis for this limitation in the claim.

As to claim 6, it recites the limitation "said second metal fibers layers." There is insufficient antecedent basis for this limitation in the claim.

As to claim 18 provides for the use of a stack, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claim 18 is rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd.* v. *Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 1-6, and 9-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cisar (US 6562507).

As to claim 1 Cisar discloses a stack comprising an impermeable metal structure (claim 1, column 10, lines 44 to 45), one first metal fiber layer and one second metal fiber layer made of sintered metal fibers (claim 2, column 10, lines 56 to 59), said impermeable metal structure being sintered to one side of said first metal fibers layer (claim 1, column 10, lines 46 to 47) , said second metal fibers layer being sintered to the other side of said first metal fibers layer (claim 7, column 7, lines 6 to 9).

Cisar does not disclose that the planar air permeability of said stack being more than 0. 02 l/min*cm, and the porosity of said second metal fiber layer being less than 80%.

Cisar discloses that testing was performed on the foam flow field for flow resistance involved observed pressure drop for constant flow, at various gas flow rates and total pressures, with air (column 8, lines 23 to 38). These gas flow measurements help to determine the variation in permeability and porosity of the foam. Cisar discloses by using sintering metal spheres you can control the size distribution of the spheres with sintering conditions, time and temperature and the porosity can be accurately controlled (column 8, lines 39 to 45). Further, Cisar discloses that first and second metal fiber layer can be made of micro and macro particle sintered porous metals (column 8, lines 46 to 48).

It would have been obvious to one of ordinary skill in the art at the time of the invention to vary the planar air permeability and porosity to adjust the reactants going to the plate for the benefit of improving the electric contact areas of the cell.

Cisar discloses that the foam flow field can be used with various air flow rates, thus recognizing that the air permeability is a result effective variable of the foam flow plates. It has been held by the courts that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F. 2d 272, 205 USPQ 215 (CCPA 1980). See MPEP 2144.05 IIB. Cisar discloses "By controlling the size distribution of the spheres and the sintering conditions, time and temperature, the porosity of the finished part can be accurately, and reproducibly, controlled" (column 8, lines 41 to 44), thus recognizing that the porosity is a result effective variable of the metal fiber layer. It has been held by the courts that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F. 2d 272, 205 USPQ 215 (CCPA 1980). See MPEP 2144.05 IIB.

As for claim 2 Cisar discloses a stack as in claim 1, said stack comprising two first metal fiber layers (102 in fig. 15) and two second metal fiber layers (104 in fig. 15), said first metal fiber layers being sintered each to one side of the impermeable metal structure (112 in fig. 15), said second metal fiber layers being sintered to the other sides of said first metal fiber layers (column 9, lines 48 to 52).

As to claim 3 Cisar does disclose a stack with said first metal fiber layers having a porosity of more than 80%. Cisar does disclose the nickel foam in his invention has a

nominal density of 5% that of the solid metal and a nominal pore spacing of 80 pores per linear inch (column 8, lines 14 to 16). Cisar also disclose the flow fields for PEM fuel cell stacks have also been made successfully using low density nickel foam (column 8, lines 8 to 10).

As to claim 4 Cisar does not disclose a stack as in claim 1, said second metal fiber layers having a perpendicular air permeability of less than 200 l/min*dm2. Cisar does discloses that testing was performed on the foam flow field for flow resistance which involved observed pressure drop for constant flow, at various gas flow rates and total pressures, with air (column 8, lines 23 to 38). These gas flow measurements help to determine the variation in permeability and porosity of the foam.

It would have been obvious to one of ordinary skill in the art at the time of the invention to vary the planar air permeability and porosity to adjust the reactants going to the plate for the benefit of improving the electric contact areas of the cell. Cisar discloses that the foam flow field can be used with various air flow rates, thus recognizing that the air permeability is a result effective variable of the foam flow plates. It has been held by the courts that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F. 2d 272, 205 USPQ 215 (CCPA 1980). See MPEP 2144.05 IIB.

As to claim 5 Cisar does not disclose a stack as in claim 1, said first metal fiber layers comprising fibers with equivalent diameter of more than 20um. Cisar does disclose using micro and macro particle sintered porous metals can be used to form the electrode substrates and current collectors (column 8, lines 46 to 48). Cisar also

discloses by using sintering metal spheres until they bond into a solid monolithic mass to produce a porous metal component and by controlling the conditions of the size distribution of the spheres, and the sintering conditions, time and temperature, the porosity of the finished part can be accurately and reproductibly controlled (column 8, lines 39 to 45).

It would have been obvious to vary the equivalent diameter of the metal fiber layer for the benefit of varying the porosity of the metal fiber layers. Cisar discloses that by using sintering metal spheres to form a porous metal component can also determine the desire diameter of the metal fiber layer as a result effective variable. It has been held by the courts that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F. 2d 272, 205 USPQ 215 (CCPA 1980). See MPEP 2144.05 IIB.

As to claim 6 Cisar does not disclose a stack as in claim 1, said second metal fibers layers comprising fibers with equivalent diameter of less than 30um. Cisar does disclose using micro and macro particle sintered porous metals can be used to form the electrode substrates and current collectors (column 8, lines 46 to 48). Cisar also discloses by using sintering metal spheres until they bond into a solid monolithic mass to produce a porous metal component and by controlling the conditions of the size distribution of the spheres, and the sintering conditions, time and temperature, the porosity of the finished part can be accurately and reproductibly controlled (column 8, lines 39 to 45).

It would have been obvious to vary the equivalent diameter of the metal fiber layer for the benefit of varying the porosity of the metal fiber layers. Cisar discloses that by using sintering metal spheres to form a porous metal component can also determine the desire diameter of the metal fiber layer as a result effective variable. It has been held by the courts that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F. 2d 272, 205 USPQ 215 (CCPA 1980). See MPEP 2144.05 IIB.

As to claim 9 Cisar does not disclose said stack having a transversal electric resistance less than 30*10-3 Ohm. Cisar discloses that the component or subassembly provides a metal structure having higher electrical conductivity than conventional bipolar plates or stack structures (column 6, lines 18 to 20).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to reduce the electric resistance in order to achieve higher electrical conductivity in the metal structure. Higher electrical conductivity in the invention can reduce the number of parts in the unit and thus making it lighter in weight.

As for claim 10 Cisar discloses a stack as in claim 1, said impermeable metal structure being a fluid cooled plate (claim 14).

As for claim 11 Cisar discloses a stack as in claim 1, said impermeable metal structure being a metal foil gas barrier (claim 1).

As for claim 12 Cisar discloses a stack as in claim 1, said metal fibers being stainless steel fibers (claim 3) .

As for claim 13 Cisar discloses a stack as in claim 1, said metal fibers being Ni-fibers or Ni alloy fibers (claim 3).

As for claim 14 Cisar discloses a stack as in claim 1, said metal fibers being Ti-fibers (claim 3).

As for claim 15 Cisar discloses a stack as in claim 1, said metal fibers having the same alloy of said impermeable metal structure by combining all three structures into a single unitary metallic part which includes gas distribution structure, the gas diffusion structure, and the gas barrier structure (Abstract, lines 8 to 11).

As for claim 16 Cisar discloses wherein the electrochemical cells are fuel cells, comprising stacks as in claim 1 (claim 26).

As for claim 17 Cisar discloses wherein the electrochemical cells are electrolyser cells, comprising stacks as in claim 1 (claim 27).

As for claim 18 Cisar discloses the use of a stack as in claim 1 in electrochemical reactors, in fuel cells or fuel cell stack (Abstract, lines 1 to 5).

8. Claims 7 and 8 rejected under 35 U.S.C. 103(a) as being unpatentable over Cisar as applied to claim 1 above and further in view of Ramunni (US 6022634).

As for claim 7 Cisar discloses a stack as in claim 1, said first metal fiber layers having a thickness of 1.1mm (column 8, lines 45 to 49), but does not disclose no more

than 0.5mm or less than 0.2mm. Ramunni teaches metal fiber layer thickness of between 0.1 and 0.3mm (US 6022634, column 3, lines 46 to 48).

It would have been obvious to one of ordinary skill in the art at the time of the invention to vary the thickness for the benefit of adjusting the distance of the gas to travel to the reaction site.

As for claim 8 Cisar discloses a stack as in claim 1, said second metal fiber layers having a thickness of 1.1mm (column 8, lines 45 to 49), but does not disclose no more than 0.5mm or less than 0.2mm. Ramunni teaches metal fiber layer thickness of between 0.1 and 0.3mm (US 6022634, column 3, lines 46 to 48).

It would have been obvious to one of ordinary skill in the art at the time of the invention to vary the thickness for the benefit of adjusting the distance of the gas to travel to the reaction site.

Contact/Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RICHARD LEUNG whose telephone number is (571)270-5261. The examiner can normally be reached on Monday to Friday 8AM to 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on (571)-272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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